

REMARKS

Claims 110-129 are pending.

Claims 110-129 are new.

Claims 6 and 27-45 are cancelled.

Claim Amendments

New claims 110-129 have been added. The claims are supported by the application as filed, for example, on pages 17-18, 24-25, 29-31, and 34-37, and figures 5-10. No new matter has been added.

Claim Rejections

Previous claims were rejected under 35 U.S.C. 103(a) as being unpatentable over various combinations of Staheli et al. U.S. Patent No. 5,537,533 ("Staheli"), Double-Take, Official Notice, and FrameRunner. The Applicants assert that claims 110-128 are patentably distinguishable from any combination the cited references as discussed in detail below. The following limitations, *inter alia*, are clearly not found within the prior art of record and that the claims should thus be in allowable form:

- Claim 110 recites "a local buffer configured to store the data changes and the meta-data blocks." Claim 112, dependent on claim 110, recites that "each meta-data block includes a timestamp associated with the associated data changes, and a sequence number associated with the associated data changes." Even if a meta-data block is described in Staheli as stored in a local buffer, no such meta-data block is described with a timestamp and a sequence number.
- Claim 116 recites "a snapshot, wherein the snapshot includes all data of the storage volume at an associated point in time." Claim 118, dependent on claim 116, recites "a volume reconstructor configured to generate data of the storage volume from a previous point in time from the snapshot, and at least one of the data changes and the meta-data blocks associated with the at least one data change." Even if a snapshot of the storage volume and data changes are described in Staheli or DoubleTake, no such generation of the storage volume at a previous point in time is described.
- Claim 125 recites that "the remote buffer is configured to store the data changes in the remote mirror in an order indicated by the associated meta-data blocks." Even if

meta-data blocks are described in Staheli, no order indicated by the meta-data blocks is described in reference to storing the data changes in a remote mirror.

An analysis of all pending claims, their limitations, and the inapplicability of the prior art to the teachings of the claims, is included below. Although the references are discussed individually, in general, the combination of additional references does not suggest or render obvious the feature missing from the main reference.

Staheli

Claim 110 recites "a meta-data block generator configured to generate a plurality of meta-data blocks, each meta-data block associated with at least one of the data changes, the meta-data blocks indicating a time that data changes associated with the meta-data blocks were made on the storage volume relative to other data changes; and a local buffer configured to store the data changes and the meta-data blocks."

The Examiner cites the link interface 34 of Staheli as the meta-data block generator. T2 of the link interface generates a packet header which uniquely identifies the data and may include a checksum. *Staheli, col. 12, ll. 37-44*. Even if the packet header is a meta-data block, neither the packet header nor the checksum are described as indicating a time that data changes were made on a storage volume. Thus, Staheli does not suggest or render obvious each and every element of claim 110 and dependent claims 111-124.

Claim 111 recites that "each meta-data block includes at least one of a timestamp associated with the associated data changes, and a sequence number associated with the associated data changes." Claim 112 recites that "each meta-data block includes a timestamp associated with the associated data changes, and a sequence number associated with the associated data changes." Neither a timestamp nor a sequence number is described in Staheli. Thus, Staheli does not suggest or render obvious each and every element of claims 111-112.

Claims 113-115 recite pausing transmission, resuming transmission, and adjusting a rate of transmission in response to a communications link monitor. No such communications link monitor is described in Staheli. Furthermore, no such adjustment of the transmission is described in Staheli. In particular, no such adjustment by the link interface 34 is described. Thus, Staheli does not suggest or render obvious each and every element of claims 113-115.

Claim 116 recites "a remote buffer coupled to the communications link and configured to receive and store the data changes and the associated meta-data blocks from the local buffer; a remote mirror including all of the data stored on the storage volume at a

current point in time; and a snapshot, wherein the snapshot includes all data of the storage volume at an associated point in time, wherin the remote buffer is configured to independently update the snapshot and the remote mirror using the data changes." Although the remote disk 20 may be a mirror of main disk 16 at some point in time, no additional snapshot or other image of the storage volume is described in Staheli. Even though nonvolatile buffers 66 have been described as storing data, nowhere is the nonvolatile buffer 66 described as storing all data of the storage volume. *Staheli, col. 12, ll. 36-38.* In particular, data is removed from the nonvolatile buffer 66 after data is received in the remote DTU 40. *Staheli, col. 13, ll. 5-16.* Thus, Staheli does not suggest or render obvious each and every element of claim 116 and dependent claims 117-118.

Claim 117 recites that "the remote buffer is configured to store in the snapshot an oldest data change of the data changes stored in the remote buffer according to the associated meta-data blocks and remove the oldest data change from the remote buffer." Even if such a snapshot is described in Staheli, no such updating of the snapshot independent of the remote mirror is described using the oldest data change. Furthermore, even if a data change that may be characterized as the oldest data change is stored in the snapshot, the characterization of the age of the data changes is not according to the associated meta-data blocks. For example, even if data in a remote DTU 40 in Staheli is stored in the order they were received, and the order received is used to indicate the oldest data, the oldest data is not determined according to the associated meta-data blocks. As a result, Staheli does not suggest or render obvious each and every element of claim 117.

Claim 118 recites "a volume reconstructor configured to generate data of the storage volume from a previous point in time from the snapshot, and at least one of the data changes and the meta-data blocks associated with the at least one data change." Even if a snapshot of the storage volume and data changes are described in Staheli, no such generation of the storage volume at a previous point in time from the snapshot is described. As a result, Staheli does not suggest or render obvious each and every element of claim 118.

Claim 119 recites "a remote buffer coupled to the communications link and configured to receive and store the data changes and the associated meta-data blocks from the local buffer; wherein the local buffer is configured to maintain a particular data change in the local buffer until after an acknowledgement indicating that the particular data change was stored in the remote buffer is received by the local buffer." Claim 121 includes a similar limitation. The nonvolatile buffer 66 cannot be the local buffer maintaining a data change until an acknowledgement is received. Staheli does describe a spoof packet as an

acknowledgement. *Staheli*, col. 13, ll. 19-22. An entry in the nonvolatile buffer 66 may be cleared in response to the acknowledgement. *Staheli*, col. 13, ll. 12-16. However, when data is sent from a DTU 30, the data in T2 is copied to the nonvolatile buffer 66 and the CSU 70. The CSU 70 places the data on the communications link 50. *Staheli*, col. 12, ll. 37-41. Thus, any possible data changes received by the remote buffer must be received from the CSU 70, not from the nonvolatile buffer 66. Thus, even though an entry of the nonvolatile buffer 66 may be cleared in response to an acknowledgement, that entry is not an entry in a local buffer as used in claims 119 and 121. As a result, *Staheli* does not suggest or render obvious each and every element of claims 119, 121, and dependent claims 120, and 122-124.

Claim 120 recites “a local mirror configured to store the data changes and including all of the data stored on the storage volume at a point in time; wherein the interface is further configured to transmit the data changes to the local buffer and the local mirror.” As described above, if the nonvolatile buffer 66 is not the local buffer, then the local buffer is not described in *Staheli*. Furthermore, if the nonvolatile buffer 66 of *Staheli* is the local buffer, then there is no other possible storage that could be the local mirror that stores all of the data stored on the storage volume at a point in time. As a result, *Staheli* does not suggest or render obvious each and every element of claims 120.

Claim 123 recites that “the local buffer is configured to remove the particular data change from the local buffer when a signature associated with the particular data change and received by the local buffer is validated.” Claim 124 recites that “the signature is a checksum.” Thus, a signature is received by the local buffer. At most, in *Staheli*, an acknowledgement is sent. There is no mention of the content of the acknowledgement, in particular, no mention of a signature used to validate the data change. Furthermore, the only mention of a checksum in *Staheli* is as part of transmitting the data between the DTUs 30 and 40. *Staheli*, col. 12, ll. 41-45. Thus, no signature or checksum is received by the local buffer and validated. As a result, *Staheli* does not suggest or render obvious each and every element of claims 123 and 124.

Claim 125 recites that “the remote buffer is configured to store the data changes in the remote mirror in an order indicated by the associated meta-data blocks.” There is no mention in *Staheli* of an order of the storage of data in a remote mirror such as the remote disk 20. Data blocks are described in isolation and not related to one another. Thus there is no mention of an order of storage according to the meta-data blocks. As a result, *Staheli* does not suggest or render obvious each and every element of claims 125.

DoubleTake

As described above, Staheli does not describe a remote mirror and a snapshot as recited in claim 116. DoubleTake does describe incremental mirroring with an initial baseline that is updated by file deltas. *DoubleTake*, p. 13. However, nowhere in DoubleTake is another baseline maintained, or that baseline and a current remote mirror. As a result, the combination of and DoubleTake does not suggest or render obvious each and every element of claim 116 and dependent claims 117 and 118.

Claim 126 recites:

“a plurality of hosts, each host including a primary storage volume;
a plurality of first mirroring units, each mirroring unit coupled to an associated host
and configured to mirror the primary storage volume of the associated host, such that each
host is coupled to its own first mirroring unit.”

Thus, each host is coupled to at least one first mirroring unit.

Claim 126 further recites:

“a second mirroring unit coupled to the first mirroring units, the second mirroring
unit configured to mirror the mirrored primary storage volumes of the first mirroring units.”

Thus, the first mirroring units are mirrored in the second mirroring unit.

The mirroring in Staheli is at most mirroring from the primary server to two or more mirrors. *Staheli*, col. 14, ll. 54-62. Thus, Staheli does not describe multiple hosts and associated first mirroring units.

Although DoubleTake describes multiple production servers replicated on the optional high availability server, no production server includes its own mirroring units that are subsequently mirrored to a second mirroring unit. *DoubleTake*, p. 8, 13-15.

Thus, the combination of Staheli and DoubleTake does not suggest or render obvious each and every element of claim 126 and dependent claims 127-129.

Claim 127 recites that “the second mirroring unit locks access to a mirror of a mirrored primary storage volume in response to an access by an associated first mirroring unit.” Neither Staheli nor DoubleTake describe or suggest such limitation on access to a mirrored volume. Thus, the combination of Staheli and DoubleTake does not suggest or render obvious each and every element of claim 127.

Claim 128 recites that “the second mirroring unit is further configured to provide a secondary host with access to a mirror of a mirrored primary storage volume through a network-based data window.” Claim 129 recites that “the network-based data window includes a browser plugin.” Neither Staheli nor DoubleTake describe such a data window as described in the specification. *See Application*, p. 37. Furthermore, even if such a data

window is described in DoubleTake, such as the access to a target server, the access is not described as a browser plugin. Thus, the combination of Staheli and DoubleTake does not suggest or render obvious each and every element of claim 128 and 129.

Conclusion

For the foregoing reasons, reconsideration and allowance of claims 110-129 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, P.C.



Derek Meeker
Reg. No. 53,313

MARGER JOHNSON & McCOLLOM, P.C.
210 SW Morrison Street, Suite 400
Portland, OR 97204
503-222-3613
Customer No. 20575

Docket No. 6071-002

Page 11 of 11

Application No. 09/438,184